5.1 DIABETES MELLITUS

AEROMEDICAL CONCERNS: The primary concern in a diabetic patient, acutely, is the possibility of unexpected hypoglycemia and associated risk of sudden loss of consciousness. This risk is greatest among those with Type 1 diabetes mellitus, but may also occur in diabetics controlled with oral anti-diabetic medications. The long-term complications of diabetes include renal, cardiovascular, neurological and visual problems. Deployment frequently decreases control secondary to uncontrolled diet, long work hours and environmental stressors. Both Type 1 and Type 2 diabetes mellitus is disqualifying for all aviation duties.

WAIVERS:
Type 1 Diabetes mellitus:
Waiver **will not** be considered.

Type 2 Diabetes mellitus:
Candidate or student status in:

NA/NFO waiver **will not** be considered.

Aeromedical officers, Air Traffic Controller, or Naval Aircrew, waiver is generally **not** recommended.

Designated aviation personnel:
Controlled without medication (diet and weight control):

All classes, waiver will be considered.

Life style modifications must result in a normal fasting blood sugar (< 110 mg/dl), a glycosylated hemoglobin (Hgb A1C) < 7.0%, and no medical sequelae.

Controlled with approved medication (Metformin or Thiazolidinediones (TZDs)*:

Service group 1 or 2, waiver **will not** be considered.

Service group 3, waiver will be considered on a case by case basis but will generally **not** be recommended.

Class 2 or 3, waiver is generally recommended.

*****Metformin is the oral agent of choice in aviation personnel. However, TZDs (Rosiglitazone, Pioglitazone, etc...) may be used as either a single agent for those patients who cannot tolerate metformin or may be used in combination with metformin for patients requiring a second drug for control.

Controlled with insulin or other medications (other than Metformin or TZDs):

Waiver **will not** be considered.

Impaired Glucose Tolerance (IGT), Impaired Fasting Glucose, or Gestational DM:
Not considered disqualifying in uncomplicated, completely resolved, and asymptomatic cases with Hgb A1C < 7.0%. **However,** weight and Hgb A1C shall be submitted annually with physical exam for monitoring of disease progression.

INFORMATION REQUIRED:
Initial waiver:

1. Internal Medicine/Family Practice or Endocrinology consultation
2. Ophthalmology/Optometry consult for dilated diabetic eye exam (establishment of baseline)
3. Neurological exam with attention to peripheral neuropathies (may be done by Flight Surgeon)
4. EKG
5. Blood pressure (goal < 135/80)
6. Average FBG < 120 mg/dl
7. Labs
    a. Hgb A1C < 7.0% after controlled
    b. Chem 7 (lytes, BUN, creatinine, glucose)
    c. Lipid profile (goal LDL < 100)
    d. LFT (for TZDs q 2 months x 1 yr & then q 6-12 months)
    e. UA
    f. Urine micro albumin/creatinine ratio
    g. Anti-glutamic acid decarboxylase (anti-GAD, a marker for Type 1 diabetes)
8. Weight and height for baseline body mass index (BMI)
9. Testing confirming the diagnosis (See below)

Category	**Normal**	**Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG)**	**Diabetes Mellitus (DM)**	**Gestational DM**
Fasting Blood Sugar (FBS)*	**< 110**	**110 < IFG <126**	**> 126**	**> 105**
2-hours Glucose Tolerance Test (GTT) (after 75gm glucose load)	**< 140**	**140 < IGT < 200**	**> 200**	**> 165**
Random Blood Glucose **	**> 200 (plus symptoms)*** **			

* FBS is defined as no caloric intake for at least 8 hours.
** Random blood glucose is defined as at any time of day without regard to time since last caloric intake.
*** Polyuria, polydipsia, unexplained weight loss (sometimes polyphagia), and/or blurred vision

Follow up/Resubmission (annually):

1. Internal medicine/Family Practice or Endocrinology consultation
2. Ophthalmology/Optometry consult for dilated diabetic eye exam
3. EKG and Blood pressure (goal < 135/80)
4. Maintenance average FBG < 120 mg/dlHgb A1C < 7.0%
5. Labs
    a. Hgb A1C < 7.0%
    b. Chem 7 (lytes, BUN, creatinine, glucose)
    c. Lipid profile (goal LDL < 100)
    d. LFT (for TZDs q 2 months x 1 yr & then q 6-12 months)
    e. UA
    f. Urine micro albumin/creatinine ratio.
6. BMI at baseline or below
7. Documentation by Flight Surgeon to include:
    a. Level of control (summary of before meal Accuhecks, blood sugars between visits, changes in weight)
    b. Follow-up visits
    c. Neurological exam

Waiver terminated if:

1. Lack of understanding of disease process
2. Non-compliant with medications
3. Unwilling to perform Accuchecks
4. Hgb-A1C is > 7.0 (on two occasions 3 months apart)
5. BMI is greater than the baseline BMI

Special Note:
Metformin and thiazolidinedione waivers are meant for Type 2 diabetics who require additional assistance in controlling serum glucose. Waivers are not meant for the individual who is extremely hard to control, or who is non-compliant with medical recommendations. Waivers should only be recommended for those individuals that demonstrate the motivation to learn about their disease process and participate in their care.

TREATMENT:

Diabetes Mellitus:
For aviation personnel, the following are approved methods of treatment:

1. Diet
2. Weight reduction
3. A limited number of oral anti-diabetic medications as listed above

Impaired Glucose Tolerance:
Diet, exercise, and weight reduction are primary therapies. These individuals need aggressive cardiac risk factors modification.

DISCUSSION:

The major concern for most oral anti-diabetic medications is the precipitation of hypoglycemia. Metformin and Thiazolidinediones (TZDs) (Rosiglitazone, Pioglitazone, etc...) do not stimulate the release of insulin. Due to their mechanisms of action, the risk of hypoglycemia is present but extremely rare. Therefore, they are the most suitable oral anti-diabetic agents available for controlling type 2 diabetics in the aviation environment. They were chosen as the only oral anti-hyperglycemic agents allowed for use in the aviation community due to their well-established efficacy and safety profile. The unique mechanism of action minimizes the risk of hypoglycemia except under the most extreme circumstances (ex. starvation).

Compared to healthy aviators, poorly controlled diabetics are twice as likely to have a stroke, 2 to 10 times more likely to suffer a myocardial infarction, and 5 to 10 times more likely to suffer peripheral vascular disease. The Diabetes Control and Complications Trial (DCCT 1993) demonstrated the importance of tight control in preventing end-organ damage. The American Diabetes Association (ADA) lowered the fasting blood glucose for the diagnosis of diabetes to > 126 mg/dl in 1995. **NAMI emphasizes tight control of blood sugar over the entire aviation career.**

Screening FBG is strongly recommended annually for all individuals at higher risk for developing diabetes. These include: (1) Individuals with a parent, sibling, or child with DM; (2) A history of gestational DM or impaired glucose tolerance; (3) A history of previous abnormality of glucose tolerance associated with the metabolic stresses, obesity, trauma, surgery, infection, or alcohol intoxication; (4) A history of hypertension; (5) Cholesterol abnormalities with HDL < 35 mg/dl and or triglyceride level > 250 mg/dl, and (6) member of high risk ethnic population (See references).

REFERENCES:

American Diabetes Association, Report of the Expert Committee on the Diagnosis and Classification of Diabetes Melliuts, Diabetes 25 (S1) 5-20, January 2002.
American Diabetes Association: http://www.diabetes.org/
Katheleen L. Wyne, The Need for Reappraisal of Type 2 Diabetes Mellitus Managent, A Special Report, Postgraduate Medicine, 5-14, May 2003.
Silvio E. Inzucchi, Oral Antihyperglycemic Therapy for Type 2 Diabetes, Scientific Review, JAMA 287(3) 360-372.

ICD-9 CODES:
250.03 Diabetes Mellitus 1
250.02 Diabetes Mellitus 2
250.0d Diabetes Mellitus – Diet controlled

5.2 GOUT

AEROMEDICAL CONCERNS: Gout may present as an acute severe arthritis without warning. It may be associated with atherosclerosis, diabetes, hypertension, and renal disease.

WAIVER: Both gout and the medications used for treatment are CD. Waivers are recommended to SG3, Class II, and Class III. Waivers to SG1 will be considered after 3 months if member remains asymptomatic and on a stable dose of medication (if required).

INFORMATION REQUIRED:

1. Chem 7
2. Serum Uric Acid (with at least one value obtained on current treatment regimen, if prescribed)
3. Medical treatment and dosage (if prophylactic medications are prescribed)
4. Confirmation of absence of renal stones within the collecting system (plain film KUB is adequate)
5. Parenchymal renolithiasis is CD as well but may considered for waiver (See chapter on renal stones).

TREATMENT: The first episode of presumed gout is usually treated with a non-steroidal anti-inflammatory agent. Should the patient have a reoccurrence, a joint aspiration should be considered to confirm the diagnosis. Allopurinol or Probenecid may be necessary to control the symptoms.

DISCUSSION: The incidence of concomitant uric acid renal stones is up to 25% although some series have reported an incidence of up to 40%. Starting treatment with Probenecid can precipitate stone formation in the kidney and the maintenance of an alkali diuresis at the start of treatment is recommended. Those patients who are asymptomatic with a serum uric acid greater than 10 mg/dl have a 90% chance of an attack of gout. Of relevance to aircrew is the association of gout with increased alcohol consumption.

ICD-9 CODE:
274.9 Gout

5.3 HYPERTHYROIDISM

AEROMEDICAL CONCERNS: An atypical presentation, with cardiac or psychiatric symptoms, is common in men. Patients with thyroid ophthalmopathy frequently have difficulty in upward gaze. Corneal damage and optic neuropathy can also occur.

WAIVER: Waiver may be considered once the patient is euthyroid on a stable dose of replacement medication if required. Patients with ophthalmopathy will need to be grounded while undergoing treatment and may need to be disqualified permanently if treatment is unsuccessful. Waivers are **not granted for the use of propylthiouracil.**

INFORMATION REQUIRED:

1. Endocrinology consult
2. Laboratory studies as indicated or ordered by endocrinologist
3. Treatment summary (to include method of ablation if performed)
4. Ophthalmology consultation is also required if exophthalmos or other eye conditions are suspected
5. Annual confirmation of clinical and chemical euthyroid status is needed for waiver renewal

TREATMENT: There are three primary forms of therapy: medical treatment with methimazole or similar drugs; radioactive iodine; and surgery. Methimazole may cause side effects including vertigo and drowsiness, as well as agranulocytosis. Surgery is declining in popularity but may be the treatment of choice in females of childbearing age. A small number of cases will require eye surgery.

DISCUSSION: Muscle pain, weakness and stiffness are the presenting symptoms in 25% of patients. Bulbar involvement can occur. With drug treatment, there is a 50% relapse rate, with some cases relapsing early. With I131, 10 to 15% of cases will be hypothyroid within 2 years, and 50 to 60% will be hypothyroid within 20 years. A third of patients undergoing surgery will be hypothyroid within 10 years. The complete remission rate after radioactive iodine is 86% with 60% developing myxedema after 10 years and a further 2-3% a year developing myxedema after that. Only 5% of patients with Graves' disease will have ophthalmopathy. More than 50% of cases of exophthalmos will spontaneously remit within 5 years with no other treatment than that of the underlying condition. Only 5% of patients will require ocular surgical intervention.

ICD-9 CODES:
242.03 Hyperthyroidism
241.0 Thyroid Nodule
241.1 Multinodular Goiter, non-toxic
240.9 Goiter, unspecified
242.9 Thyrotoxicosis without mention of goiter or other cause

5.4 HYPOTHYROIDISM

AEROMEDICAL CONCERNS: The insidious onset of many signs and symptoms of hypothyroidism reduces the aviator's ability to recognize abnormalities. It can foster complacency or an unwillingness to seek medical advice until performance is significantly degraded. Fatigue, lethargy, muscle weakness, decreased cognitive function, motor weakness, delayed reflexes, bradycardia, first degree heart block, cardiomegaly, pericardial effusion, depression, sensorineural hearing loss and anemia are all complications relevant to aviation. The flight surgeon must know and observe their aviators for the subtle onset of any of these signs and symptoms.

WAIVER: A history of hypothyroidism is CD for all DIF. Applicants for SNA and SNFO are CD, no waiver recommended. All other categories of applicants will be considered on a case-by-case basis. A waiver for designated personnel may be recommended for uncomplicated hypothyroidism when the patient is clinically and chemically euthyroid on a stable dose of replacement levothyroxine (at least 6 weeks), with the TSH stable and in normal range.

INFORMATION REQUIRED:

1. Endocrine or Internal Medicine/Family Practice consultation
2. Serum TSH, T4 and/or free T4 values indicating euthyroidism
3. Annual evaluation of member's thyroid status with thyroid function studies (TSH at a minimum)
4. Any deviation from euthyroid status shall be submitted to NAMI Code 42

TREATMENT: Synthroid (levothyroxine) use is waiverable in designated personnel.

DISCUSSION: The most common cause of primary hypothyroidism is chronic autoimmune thyroiditis (Hashimoto's thyroiditis). Other causes include radioactive iodine thyroid gland ablation, surgical removal of the thyroid gland, and external irradiation. Full dose replacement with levothyroxine can be instituted immediately in most patients, the exceptions being geriatric or cardiac patients. The ratio of female to male patients is approximately 5:1.

ICD-9 CODES:

244.8 Acquired hypothyroidism (iatrogenic)
245.0 Acute thyroiditis
245.1 Subacute thyroiditis
245.2 Hashimoto's thyroiditis
245.9 Thyroiditis, unspecified